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EXAMINER	
PERILLA, JASON M	

ART UNIT	PAPER NUMBER
2634	4

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.**	**Applicant(s)**	
	09/784,846	GARCERAN ET AL.	
	Examiner	**Art Unit**	
	Jason M Perilla	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 February 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 April 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2-6/01, 3-6/02,* .

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-32 are pending in the instant application.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on June 20, 2002 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

3. The formal drawing sheets were received on April 16, 2002. These drawings are accepted.

Claim Objections

4. Claim 3 is objected to for being dependent upon claim 1. Claim 3 is more readily clear if taken alone and not as dependent upon claim 1. Otherwise, a distinction between "a digital signal" of claim 1 and "a plurality of digital signals" of claim 3 is unclear. One may interpret "a digital signal" to be one of "a plurality of signals" or they may be interpreted as being exclusive.

5. Claim 12 is objected to for being dependent upon claim 10. Claim 12 is more readily clear if taken alone and not as dependent upon claim 10. Otherwise, a distinction between "a digital signal" of claim 10 and "a plurality of digital signals" of claim 12 is unclear. One may interpret "a digital signal" to be one of "a plurality of signals" or they may be interpreted as being exclusive.

6. Claim 21 is objected to for being dependent upon claim 19. Claim 21 is more readily clear if taken alone and not as dependent upon claim 19. Otherwise, a correct

relationship or distinction may not be made relating to "a digital signal" and "a plurality of digital signals".

7. Claim 28 is objected to for being dependent upon claim 26. Claim 28 is more readily clear if taken alone and not as dependent upon claim 26. Otherwise, a correct relationship or distinction may not be made relating to "a digital signal" and "a plurality of digital signals".

8. Claims 8 and 9 are objected to because of the following informalities:

Regarding claim 8, the limitation including "said RF frequency" of line 3 should be replaced by –radio frequency— for proper consistency of the claims.

Regarding claim 9, the limitation including "said RF frequency" of line 3 should be replaced by –radio frequency— for proper consistency of the claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 8, 9, 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Kelley (5220557).

Regarding claim 1, Kelley discloses a method of processing digital signals to be transmitted in analog form by figure 1, said method comprising: converting a digital signal to produce an analog signal image at a radio frequency (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26), and using said analog signal image at said radio frequency for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34).

Regarding claim 8, Kelley discloses the limitations of claim 1 as applied above. Further, Kelley discloses adjusting a conversion rate for converting said digital signal to produce said analog signal image at said RF frequency (col. 6, lines 12-26). Kelley discloses that the signal images which are replicas of the base-band signals can be altered by a factor N which is the conversion factor or sampling rate of the D/A converter.

Regarding claim 9, Kelley discloses the limitations of claim 1 as applied above. Further, it is inherent in the method of Kelley that adjusting a frequency for the digital signal to be converted into analog form to will produce an analog signal image at the RF frequency. Adjusting the frequency of the base-band digital signal (original signal) will change the frequency of the analog base-band output of the D/A converter as well as the frequencies of the analog images of the base-band signal produced by the D/A converter. Further, Kelley discloses that the carrier frequency is adjusted by the complex multiplier (fig. 1, ref. 10) and the direct digital synchronizer (fig. 1, ref. 12; col. 3, line 67-col. 4, line 6).

Regarding claim 10, Kelley discloses a method of processing digital signals to be transmitted in analog form by figure 1, said method comprising the steps of: converting a digital signal to produce a projected analog signal image (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26), and using said projected analog signal image at said radio frequency to produce analog signals for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34).

Regarding claim 17, Kelley discloses the limitations of claim 10 as applied above. Further, Kelley discloses adjusting a conversion rate for converting said digital signal to produce said projected analog signal image at said frequency (col. 6, lines 12-26). Kelley discloses that the signal images which are replicas of the base-band signals can be altered by a factor N which is the conversion factor or sampling rate of the D/A converter.

Regarding claim 18, Kelley discloses the limitations of claim 10 as applied above. Further, it is inherent in the method of Kelley that adjusting a frequency for the digital signal to be converted into analog form to will produce a projected analog signal image at the frequency. Adjusting the frequency of the base-band digital signal (original signal) will change the frequency of the analog base-band output of the D/A converter as well as the frequencies of the analog images of the base-band signal produced by the D/A converter. Further, Kelley discloses that the carrier frequency is adjusted by the complex multiplier (fig. 1, ref. 10) and the direct digital synchronizer (fig. 1, ref. 12; col. 3, line 67-col. 4, line 6).

Regarding claim 19, Kelley discloses a transmitter comprising: a digital to analog converter configured to receive a digital signal and convert said digital signal into analog form (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26), thereby producing an analog signal image at a radio frequency; and transmitter circuitry (fig. 1, refs. 34 and 36) configured to use said analog signal image at said radio frequency for transmission (col. 5, lines 27-34).

Regarding claim 22, Kelley discloses the limitations of claim 19 as applied above. Further, Kelley discloses that the transmitter circuitry comprises: a path for carrying said analog signal image (fig. 1, refs, 26, 30, 32, 34, and 36); an amplifier on said path for amplifying said analog signal image on said path (fig. 1, ref. 34); and at least one antenna for transmitting said amplified analog signal image (fig. 1, ref. 36).

Regarding claim 24, Kelley discloses the limitations of claim 1 as applied above. Further, Kelley discloses adjusting a conversion rate for said digital-to-analog converter to produce said analog signal image at said radio frequency (col. 6, lines 12-26). Kelley discloses that the signal images which are replicas of the base-band signals can be altered by a factor N which is the conversion factor or sampling rate of the D/A converter.

Regarding claim 25, Kelley discloses the limitations of claim 19 as applied above. Further, it is inherent in the method of Kelley that adjusting a digital frequency for the digital signal to be converted into analog form to will produce a projected analog signal image at the frequency. Adjusting the frequency of the base-band digital signal (original signal) will change the frequency of the analog base-band output of the D/A converter as well as the frequencies of the analog images of the base-band signal produced by the D/A converter. Further, Kelley discloses that the digital frequency is adjusted by the complex multiplier (fig. 1, ref. 10) and the direct digital synchronizer (fig. 1, ref. 12; col. 3, line 67-col. 4, line 6). Hence, Kelley discloses that the transmitter is configured to adjust a digital frequency for said digital signal to be converted into analog form (fig. 1,

ref. 26) to produce said projected analog signal image (fig. 5, ref. 50n) at said frequency.

Regarding claim 26, Kelley discloses a transmitter (fig. 1) comprising: a digital to analog converter (fig. 1, ref. 26) configured to receive a digital signal and convert said digital signal into analog form (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26), thereby producing a projected analog signal image (fig. 5); and transmitter circuitry configured to use said projected analog signal image to produce analog signals for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34).

Regarding claim 28, Kelley discloses the limitations of claim 26 as applied above. Further, Kelley discloses signal processing circuitry (fig. 1, ref. 2 and 28) configured to receive a plurality of digital signals (fig. 1, ref. 14 and 18) and to position said digital signals in non-overlapping portions of said conversion bandwidth (fig. 4); said digital to analog converter configured to convert said digital signals to produce projected analog signal images at frequencies greater than said conversion bandwidth (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26); and said transmitter circuitry configured to use said projected analog signal images for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34).

Regarding claim 29, Kelley discloses the limitations of claim 26 as applied above. Further, Kelley discloses that the transmitter circuitry includes: a path for carrying said projected analog signal image (fig. 1, refs, 26, 30, 32, 34, and 36); an amplifier on said path for amplifying said projected analog signal image on said path (fig. 1, ref. 34); and at least one antenna for transmitting said amplified analog signal image (fig. 1, ref. 36).

Regarding claim 31, Kelley discloses the limitations of claim 26 as applied above. Further, Kelley discloses adjusting a conversion rate for said digital-to-analog converter to produce said projected analog signal image at said frequency (col. 6, lines 12-26). Kelley discloses that the signal images which are replicas of the base-band signals can be altered by a factor N which is the conversion factor or sampling rate of the D/A converter.

Regarding claim 32, Kelley discloses the limitations of claim 19 as applied above. Further, it is inherent in the method of Kelley that adjusting a digital frequency for the digital signal to be converted into analog form to will produce a projected analog signal image at the frequency. Adjusting the frequency of the base-band digital signal (original signal) will change the frequency of the analog base-band output of the D/A converter as well as the frequencies of the analog images of the base-band signal produced by the D/A converter. Further, Kelley discloses that the digital frequency is adjusted by the complex multiplier (fig. 1, ref. 10) and the direct digital synchronizer (fig. 1, ref. 12; col. 3, line 67-col. 4, line 6). Hence, Kelley discloses that the transmitter is configured to adjust a digital frequency for said digital signal to be converted into analog form (fig. 1, ref. 26) to produce said projected analog signal image (fig. 5, ref. 50n) at said frequency.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 2- are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley (5220557) in view of Gibson (Gibson, Jerry D, "The Communications Handbook"; 1997, pages 107-116).

Regarding claim 2, Kelley discloses the limitations of claim 1 as applied above. Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 3, Kelley discloses the limitations of claim 1 as applied above. Further, Kelley discloses receiving a plurality of digital signals (fig. 1, refs. 16a-c; col. 3, lines 38-61); positioning said digital signals in non-overlapping portions (fig. 4. ref. 42, 44, 46, and 48); converting said digital signals to produce analog signal images at different transmission frequencies (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26); and using said analog signal images for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because

the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 4, Kelley in view of Gibson disclose the limitations of claim 3 as applied above. Further, Kelley discloses that the step of using includes: providing an analog signal image onto a path (fig. 1, refs, 26, 30, 32, 34, and 36); amplifying said analog signal image on said path (fig. 1, ref. 34); and transmitting said amplified analog signal image using at least one antenna (fig. 1, ref. 36).

Regarding claim 5, Kelley in view of Gibson disclose the limitations of claim 4 as applied above. Further Kelley discloses that the steps of providing, amplifying and transmitting include: providing a first analog signal image (fig. 4, ref. 42 as represented in fig. 5, ref. 50n as an image) of a first frequency band a second analog signal image (fig 4. refs. 44, 46, or 48 as represented in fig 5, ref. 50n as an image) of a second frequency band (col. 5, line 65-col. 6, line 5); amplifying said first analog signal image and said second analog signal image (fig. 1, ref. 34); and transmitting said first amplified analog signal image said second amplified analog signal image (fig. 1, ref. 36). Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Kelley also disclose that the method may utilize various signal modulation techniques such as AM, FM, BPSK, QPSK, or QAM (col. 3, lines 5-11). Hence, Kelley discloses that a separate “path” and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Furthermore, it

would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate amplifier for each of the first signal and the second signal each having an independent transmission path or antenna because it could be required to keep the individual signals from interfering with each other.

Regarding claim 6, Kelley in view of Gibson disclose the limitations of claim 4 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier for each signal to accompany each of the separate antennas disclosed by Kelley. Therefore, it is obvious to filter a plurality of analog signal images at different frequency bands to provide at least one analog signal image of a frequency band corresponding to each of a plurality of paths.

Regarding claim 7, Kelley in view of Gibson disclose the limitations of claim 4 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier to *selectively* produce on each of a plurality of paths at least one analog signal image. Therefore, it is obvious to selectively produce on each of a plurality of paths at least one analog signal image of a frequency band corresponding to each of said plurality of paths.

Regarding claim 11, Kelley discloses the limitations of claim 10 as applied above. Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the

conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 12, Kelley discloses the limitations of claim 10 as applied above. Further, Kelley discloses receiving a plurality of digital signals (fig. 1, refs. 16a-c; col. 3, lines 38-61); positioning said digital signals in non-overlapping portions (fig. 4. ref. 42, 44, 46, and 48); converting said digital signals to produce the projected analog signal images at frequencies greater than the conversion bandwidth (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26); and using said projected analog signal images for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly

disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 13, Kelley in view of Gibson disclose the limitations of claim 12 as applied above. Further, Kelley discloses that the step of using includes: providing a projected analog signal image onto a path (fig. 1, refs, 26, 30, 32, 34, and 36); amplifying said projected analog signal image on said path (fig. 1, ref. 34); and transmitting said amplified analog signal image using at least one antenna (fig. 1, ref. 36).

Regarding claim 15, Kelley in view of Gibson disclose the limitations of claim 13 as applied above. Further, Kelley discloses that a set of different antennas may be

employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier for each signal to accompany each of the separate antennas disclosed by Kelley. Therefore, it is obvious to filter a plurality of said projected analog signal images at different frequency bands to provide at least one projected analog signal image of a frequency band corresponding to each of a plurality of paths.

Regarding claim 16, Kelley in view of Bauer Gibson the limitations of claim 13 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if

they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier to *selectively* produce on each of a plurality of paths at least one analog signal image. Therefore, it is obvious to selectively produce on each of a plurality of paths at least one projected analog signal image of a frequency band corresponding to each of said plurality of paths.

Regarding claim 20, Kelley discloses the limitations of claim 19 as applied above. Further, Kelley discloses signal processing circuitry configured to position said digital signal (fig. 1, ref. 28 and 2; col. 3, line 62-col. 4, line 20). Kelley does not explicitly disclose signal processing circuitry configured to position the digital signal within a conversion bandwidth defined as one-half the rate converting said digital signal into analog form. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times

the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 21, Kelley discloses the limitations of claim 19 as applied above. Further, Kelley discloses signal processing circuitry (fig. 1, ref. 28) configured to receive a plurality of digital signals (fig. 1, refs. 16a-c; col. 3, lines 38-61) and to position said digital signals in non-overlapping portions of a conversion bandwidth (fig. 4. ref. 42, 44, 46, and 48); said digital-to-analog converter configured to convert said digital signals to produce analog signal images at different transmission frequencies (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26); and said transmitter circuitry configured to use said analog signal images for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling

frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 23, Kelley in view of Gibson disclose the limitations of claim 21 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Therefore, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path"

may be used for *each* of the different signals. For each path, it is obvious to use a separate amplifier for each signal to accompany each of the separate antennas disclosed by Kelley. In view of the disclosure of the use of multiple antennas by Kelley and the (thereby) obvious use of multiple amplifiers, Kelley discloses signal distribution circuitry (one amplifier and antenna for each path) configured to receive said analog signal images (fig. 5, ref. 50n) from said digital to analog converter (fig. 1, ref. 26) and to provide a first analog signal image of a first frequency band on a first path (i.e. fig. 4, ref. 42) and a second analog signal image of a second frequency band on a second path (i.e. fig. 4, ref. 44); a first amplifier on said first path for amplifying said first analog signal image on said first path; a second amplifier on said second path for amplifying said second analog signal image on said second path; a first antenna connected to said first path for transmitting said first amplified analog signal image; and a second antenna connected to said second path for transmitting said second amplified analog signal image.

Regarding claim 27, Kelley discloses the limitations of claim 26 as applied above. Further, Kelley discloses signal processing circuitry configured to position said digital signal (fig. 1, ref. 28 and 2; col. 3, line 62-col. 4, line 20). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the

Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 30, Kelley in view of Gibson disclose the limitations of claim 27 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Therefore, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate amplifier for each signal to accompany each of the separate antennas

disclosed by Kelley. In view of the disclosure of the use of multiple antennas by Kelley and the (thereby) obvious use of multiple amplifiers, Kelley discloses signal distribution circuitry (one amplifier and antenna for each path) configured to receive said projected analog signal images (fig. 5, ref. 50n) from said digital to analog converter (fig. 1, ref. 26) and to provide a first projected analog signal image of a first frequency band on a first path (i.e. fig. 4, ref. 42) and a second projected analog signal image of a second frequency band on a second path (i.e. fig. 4, ref. 44); a first amplifier on said first path for amplifying said first projected analog signal image on said first path; a second amplifier on said second path for amplifying said second projected analog signal image on said second path; a first antenna connected to said first path for transmitting said first amplified analog signal image; and a second antenna connected to said second path for transmitting said second amplified analog signal image.

12. Claims 2- are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley (5220557) in view of Bauer (3987280 – IDS reference AA).

Regarding claim 2, Kelley discloses the limitations of claim 1 as applied above. Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Bauer teaches the use of a D/A converter wherein one of a plurality of converted signal images is chosen for transmission (figs. 4a-e). Bauer further teaches that the conversion frequency (of the D/A) is equal or greater that twice the bandwidth of the

original signal so that the converted analog signal will contain the original signal as well as an infinite number of shifted replicas of the primary spectrum (col. 1, lines 55-65). Thereby, one of the shifted replicas may be chosen for band-pass filtering and transmission. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a D/A converter having a conversion bandwidth equal to or greater than twice the bandwidth of the original signal as taught by Bauer in the method of Kelley because one of the infinite number of frequency shifted versions of the original signal could subsequently be chosen for transmission.

Regarding claim 3, Kelley discloses the limitations of claim 1 as applied above. Further, Kelley discloses receiving a plurality of digital signals (fig. 1, refs. 16a-c; col. 3, lines 38-61); positioning said digital signals in non-overlapping portions (fig. 4. ref. 42, 44, 46, and 48); converting said digital signals to produce analog signal images at different transmission frequencies (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26); and using said analog signal images for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Bauer teaches the use of a D/A converter wherein one of a plurality of converted signal images is chosen for transmission (figs. 4a-e). Bauer further teaches that the conversion frequency (of the D/A) is equal or

greater that twice the bandwidth of the original signal so that the converted analog signal will contain the original signal as well as an infinite number of shifted replicas of the primary spectrum (col. 1, lines 55-65). Thereby, one of the shifted replicas may be chosen for band-pass filtering and transmission. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a D/A converter having a conversion bandwidth equal to or greater than twice the bandwidth of the original signal as taught by Bauer in the method of Kelley because one of the infinite number of frequency shifted versions of the original signal could subsequently be chosen for transmission.

Regarding claim 4, Kelley in view of Bauer disclose the limitations of claim 3 as applied above. Further, Kelley discloses that the step of using includes: providing an analog signal image onto a path (fig. 1, refs, 26, 30, 32, 34, and 36); amplifying said analog signal image on said path (fig. 1, ref. 34); and transmitting said amplified analog signal image using at least one antenna (fig. 1, ref. 36).

Regarding claim 5, Kelley in view of Bauer disclose the limitations of claim 4 as applied above. Further Kelley discloses that the steps of providing, amplifying and transmitting include: providing a first analog signal image (fig. 4, ref. 42 as represented in fig. 5, ref. 50n as an image) of a first frequency band a second analog signal image (fig 4. refs. 44, 46, or 48 as represented in fig 5, ref. 50n as an image) of a second frequency band (col. 5, line 65-col. 6, line 5); amplifying said first analog signal image and said second analog signal image (fig. 1, ref. 34); and transmitting said first amplified analog signal image said second amplified analog signal image (fig. 1, ref. 36). Further,

Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Kelley also disclose that the method may utilize various signal modulation techniques such as AM, FM, BPSK, QPSK, or QAM (col. 3, lines 5-11). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Furthermore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate amplifier for each of the first signal and the second signal each having an independent transmission path or antenna because it could be required to keep the individual signals from interfering with each other.

Regarding claim 6, Kelley in view of Bauer disclose the limitations of claim 4 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the

art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier for each signal to accompany each of the separate antennas disclosed by Kelley. Therefore, it is obvious to filter a plurality of analog signal images at different frequency bands to provide at least one analog signal image of a frequency band corresponding to each of a plurality of paths.

Regarding claim 7, Kelley in view of Bauer disclose the limitations of claim 4 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier to *selectively* produce on each of a plurality of paths at least one

analog signal image. Therefore, it is obvious to selectively produce on each of a plurality of paths at least one analog signal image of a frequency band corresponding to each of said plurality of paths.

Regarding claim 11, Kelley discloses the limitations of claim 10 as applied above. Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Bauer teaches the use of a D/A converter wherein one of a plurality of converted signal images is chosen for transmission (figs. 4a-e). Bauer further teaches that the conversion frequency (of the D/A) is equal or greater that twice the bandwidth of the original signal so that the converted analog signal will contain the original signal as well as an infinite number of shifted replicas of the primary spectrum (col. 1, lines 55-65). Thereby, one of the shifted replicas may be chosen for band-pass filtering and transmission. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a D/A converter having a conversion bandwidth equal to or greater than twice the bandwidth of the original signal as taught by Bauer in the method of Kelley because one of the infinite number of frequency shifted versions of the original signal could subsequently be chosen for transmission.

Regarding claim 12, Kelley discloses the limitations of claim 10 as applied above. Further, Kelley discloses receiving a plurality of digital signals (fig. 1, refs. 16a-c; col. 3,

lines 38-61); positioning said digital signals in non-overlapping portions (fig. 4. ref. 42, 44, 46, and 48); converting said digital signals to produce the projected analog signal images at frequencies greater than the conversion bandwidth (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26); and using said projected analog signal images for transmission (fig. 1, refs. 34 and 36; col. 5, lines 27-34). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Gibson teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 13, Kelley in view of Bauer disclose the limitations of claim 12 as applied above. Further, Kelley discloses that the step of using includes: providing a projected analog signal image onto a path (fig. 1, refs, 26, 30, 32, 34, and 36); amplifying said projected analog signal image on said path (fig. 1, ref. 34); and transmitting said amplified analog signal image using at least one antenna (fig. 1, ref. 36).

Regarding claim 14, Kelley in view of Bauer disclose the limitations of claim 13 as applied above. Further Kelley discloses that the steps of providing, amplifying and transmitting include: providing a first projected analog signal image (fig. 4, ref. 42 as represented in fig. 5, ref. 50n as an image) of a first frequency band and a second projected analog signal image (fig 4. refs. 44, 46, or 48 as represented in fig 5, ref. 50n as an image) of a second frequency band (col. 5, line 65-col. 6, line 5); amplifying said first projected analog signal image and said second projected analog signal image (fig. 1, ref. 34); and transmitting said first amplified analog signal image said second amplified analog signal image (fig. 1, ref. 36). Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Kelley also disclose that the method may utilize various signal modulation techniques such as AM, FM, BPSK, QPSK, or QAM (col. 3, lines 5-11). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Furthermore, it would have been obvious

to one having ordinary skill in the art at the time which the invention was made to utilize a separate amplifier for each of the first signal and the second signal each having an independent transmission path or antenna because it could be required to keep the individual signals from interfering with each other.

Regarding claim 15, Kelley in view of Bauer disclose the limitations of claim 13 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier for each signal to accompany each of the separate antennas disclosed by Kelley. Therefore, it is obvious to filter a plurality of said projected analog signal images at different frequency bands to provide at least one projected analog signal image of a frequency band corresponding to each of a plurality of paths.

Regarding claim 16, Kelley in view of Bauer disclose the limitations of claim 13 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier to *selectively* produce on each of a plurality of paths at least one analog signal image. Therefore, it is obvious to selectively produce on each of a plurality of paths at least one projected analog signal image of a frequency band corresponding to each of said plurality of paths.

Regarding claim 20, Kelley discloses the limitations of claim 19 as applied above. Further, Kelley discloses signal processing circuitry configured to position said digital signal (fig. 1, ref. 28 and 2; col. 3, line 62-col. 4, line 20). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half

the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Bauer teaches the use of a D/A converter wherein one of a plurality of converted signal images is chosen for transmission (figs. 4a-e). Bauer further teaches that the conversion frequency (of the D/A) is equal or greater that twice the bandwidth of the original signal so that the converted analog signal will contain the original signal as well as an infinite number of shifted replicas of the primary spectrum (col. 1, lines 55-65). Thereby, one of the shifted replicas may be chosen for band-pass filtering and transmission. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a D/A converter having a conversion bandwidth equal to or greater than twice the bandwidth of the original signal as taught by Bauer in the method of Kelley because one of the infinite number of frequency shifted versions of the original signal could subsequently be chosen for transmission.

Regarding claim 21, Kelley discloses the limitations of claim 19 as applied above. Further, Kelley discloses signal processing circuitry (fig. 1, ref. 28) configured to receive a plurality of digital signals (fig. 1, refs. 16a-c; col. 3, lines 38-61) and to position said digital signals in non-overlapping portions of a conversion bandwidth (fig. 4. ref. 42, 44, 46, and 48); said digital-to-analog converter configured to convert said digital signals to produce analog signal images at different transmission frequencies (fig. 1, ref. 34; fig. 5, ref. 50n; col. 1, line 66-col. 2, line 3; col. 6, lines 9-26); and said transmitter circuitry configured to use said analog signal images for transmission (fig. 1, refs. 34 and 36; col.

5, lines 27-34). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Bauer teaches the use of Nyquist A/D, and analogously, D/A converters. One skilled in the art is familiar with the Nyquist sampling criteria which states that a A/D or D/A conversion must be performed at least two times the frequency of the highest frequency contained in the signal being converted. Further, Gibson teaches a Nyquist A/D (D/A) converter which makes use of a sampling rate that is twice the highest frequency in the signal being converted (page 109, lines 28-32). Hence, the digital signal has a bandwidth that is one-half that of the conversion frequency. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to position the digital signal within a conversion bandwidth being one-half that of the frequency of the converter as taught by Gibson in the method of processing a digital signal to be transmitted of Kelley because the signal could be faithfully reproduced without the loss of any signal components in the conversion.

Regarding claim 23, Kelley in view of Bauer disclose the limitations of claim 21 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be

transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Therefore, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate amplifier for each signal to accompany each of the separate antennas disclosed by Kelley. In view of the disclosure of the use of multiple antennas by Kelley and the (thereby) obvious use of multiple amplifiers, Kelley discloses signal distribution circuitry (one amplifier and antenna for each path) configured to receive said analog signal images (fig. 5, ref. 50n) from said digital to analog converter (fig. 1, ref. 26) and to provide a first analog signal image of a first frequency band on a first path (i.e. fig. 4, ref. 42) and a second analog signal image of a second frequency band on a second path (i.e. fig. 4, ref. 44); a first amplifier on said first path for amplifying said first analog signal image on said first path; a second amplifier on said second path for amplifying said second analog signal image on said second path; a first antenna connected to said first path for transmitting said first amplified analog signal image; and a second antenna connected to said second path for transmitting said second amplified analog signal image.

Regarding claim 27, Kelley discloses the limitations of claim 26 as applied above. Further, Kelley discloses signal processing circuitry configured to position said digital signal (fig. 1, ref. 28 and 2; col. 3, line 62-col. 4, line 20). Kelley does not explicitly disclose positioning the digital signal within a conversion bandwidth defined as one-half

the rate of said converting. Alternatively, Kelley does not explicitly disclose that the bandwidth of the digital signal is one-half the frequency of the conversion rate or digital-to-analog (D/A) converter sampling frequency. However, Bauer teaches the use of a D/A converter wherein one of a plurality of converted signal images is chosen for transmission (figs. 4a-e). Bauer further teaches that the conversion frequency (of the D/A) is equal or greater that twice the bandwidth of the original signal so that the converted analog signal will contain the original signal as well as an infinite number of shifted replicas of the primary spectrum (col. 1, lines 55-65). Thereby, one of the shifted replicas may be chosen for band-pass filtering and transmission. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a D/A converter having a conversion bandwidth equal to or greater than twice the bandwidth of the original signal as taught by Bauer in the method of Kelley because one of the infinite number of frequency shifted versions of the original signal could subsequently be chosen for transmission.

Regarding claim 30, Kelley in view of Bauer disclose the limitations of claim 27 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Therefore, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the

various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate amplifier for each signal to accompany each of the separate antennas disclosed by Kelley. In view of the disclosure of the use of multiple antennas by Kelley and the (thereby) obvious use of multiple amplifiers, Kelley discloses signal distribution circuitry (one amplifier and antenna for each path) configured to receive said projected analog signal images (fig. 5, ref. 50n) from said digital to analog converter (fig. 1, ref. 26) and to provide a first projected analog signal image of a first frequency band on a first path (i.e. fig. 4, ref. 42) and a second projected analog signal image of a second frequency band on a second path (i.e. fig. 4, ref. 44); a first amplifier on said first path for amplifying said first projected analog signal image on said first path; a second amplifier on said second path for amplifying said second projected analog signal image on said second path; a first antenna connected to said first path for transmitting said first amplified analog signal image; and a second antenna connected to said second path for transmitting said second amplified analog signal image.

13. Claims 5-7, 14-16, 23 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley in view of alternatively Bauer or Gibson as applied above, and in further view of Copeland et al (5924031).

Regarding claim 5, Kelley in view of alternatively Bauer or Gibson disclose the limitations of claim 4 as applied above. Further Kelley discloses that the steps of providing, amplifying and transmitting include: providing a first analog signal image (fig. 4, ref. 42 as represented in fig. 5, ref. 50n as an image) of a first frequency band a

second analog signal image (fig 4. refs. 44, 46, or 48 as represented in fig 5, ref. 50n as an image) of a second frequency band (col. 5, line 65-col. 6, line 5); amplifying said first analog signal image and said second analog signal image (fig. 1, ref. 34); and transmitting said first amplified analog signal image said second amplified analog signal image (fig. 1, ref. 36). Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley does not explicitly disclose the use of a separate amplifier for each path. However, Copeland et al teaches a transmitter having a plurality of transmission paths (fig. 5, refs. 60T, 62T, and 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate amplifier for each of the first signal and the second signal each having an independent transmission path or antenna as taught by Copeland et al in the method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Regarding claim 6, Kelley in view of Bauer disclose the limitations of claim 4 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission

channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. Kelley does not explicitly disclose the use of a separate filter for each path. However, Copeland et al teaches a transmitter having a plurality of transmission paths (fig. 5, refs. 60T, 62T, an 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate filter for each of the plurality of analog signal images each having an independent transmission path or antenna as taught by Copeland et al in the method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Regarding claim 7, Kelley in view of Bauer disclose the limitations of claim 4 as applied above. Further, Kelley discloses that a set of different antennas may be

employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier to *selectively* produce on each of a plurality of paths at least one analog signal image. Kelley does not explicitly disclose the use of a separate filter for each path. However, Copeland et al teaches a transmitter having a plurality of transmission paths (fig. 5, refs. 60T, 62T, an 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate filter to selectively produce each of the plurality of projected analog signal images each having an independent transmission path or antenna as taught by Copeland et al in the

method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Regarding claim 14, Kelley in view of alternatively Bauer or Gibson disclose the limitations of claim 13 as applied above. Further Kelley discloses that the steps of providing, amplifying and transmitting include: providing a first projected analog signal image (fig. 4, ref. 42 as represented in fig. 5, ref. 50n as an image) of a first frequency band a second projected analog signal image (fig 4. refs. 44, 46, or 48 as represented in fig 5, ref. 50n as an image) of a second frequency band (col. 5, line 65-col. 6, line 5); amplifying said first projected analog signal image and said second projected analog signal image (fig. 1, ref. 34); and transmitting said first amplified analog signal image said second amplified analog signal image (fig. 1, ref. 36). Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley does not explicitly disclose the use of a separate amplifier for each path. However, Copeland et al teaches a transmitter having a plurality of transmission paths (fig. 5, refs. 60T, 62T, an 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate amplifier for

each of the first signal and the second signal each having an independent transmission path or antenna as taught by Copeland et al in the method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Regarding claim 15, Kelley in view of Bauer disclose the limitations of claim 13 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. Kelley does not explicitly disclose the use of a separate filter for each path. However, Copeland et al teaches a transmitter having a plurality of transmission paths (fig. 5, refs. 60T, 62T, an 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26). Therefore, it would have been obvious to one having

ordinary skill in the art at the time which the invention was made to utilize a separate filter for each of the plurality of projected analog signal images each having an independent transmission path or antenna as taught by Copeland et al in the method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Regarding claim 16, Kelley in view of Bauer disclose the limitations of claim 13 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Kelley also discloses, in the case which all of the plurality of signals (fig. 4, refs. 42, 44, 46, and 48) are amplified and transmitted together, that a single band-pass filter (fig. 1, ref. 32; fig. 5, ref. 32) is used to reject the base-band signals and all of the aliased images so that only the one desired aliased image remains (col. 6, lines 6-10). However, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. For each path, it is obvious to use a separate band-pass filter and amplifier to *selectively* produce on each of a plurality of paths at least one analog signal image. Kelley does not explicitly disclose the use of a separate filter for each path. However, Copeland et al teaches a transmitter having a plurality of

transmission paths (fig. 5, refs. 60T, 62T, an 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate filter to selectively produce each of the plurality of projected analog signal images each having an independent transmission path or antenna as taught by Copeland et al in the method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Regarding claim 23, Kelley in view of alternatively Bauer or Gibson disclose the limitations of claim 21 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Therefore, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. Kelley does not explicitly disclose the use of a separate amplifier for each path. However, Copeland et al teaches a transmitter having a plurality of transmission paths (fig. 5, refs. 60T, 62T, an 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26).

Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate amplifier for each of the first projected signal and the second projected signal each having an independent transmission path or antenna as taught by Copeland et al in the method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Regarding claim 30, Kelley in view of alternatively Bauer or Gibson disclose the limitations of claim 27 as applied above. Further, Kelley discloses that a set of different antennas may be employed if a single antenna is not compatible with each of the different transmission channels (col. 4, lines 31-35). Hence, Kelley discloses that a separate "path" and a separate antenna may be required for the various signals as shown in figure 4 to be transmitted in the case which the signals would otherwise interfere with each other if they were transmitted on the same antenna. Therefore, it is obvious to one of ordinary skill in the art that, in the case which one antenna would be utilized for *each* of the various signals of figure 4 to avoid interference between the signals, a separate "path" may be used for *each* of the different signals. Kelley does not explicitly disclose the use of a separate amplifier for each path. However, Copeland et al teaches a transmitter having a plurality of transmission paths (fig. 5, refs. 60T, 62T, an 66T). Copeland et al further teaches the use of a separate amplifier (fig. 5, ref. 115) and band-pass filter (fig. 5, ref. 116) for each antenna path (col. 4, lines 24-26). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a separate amplifier for each of the first

projected signal and the second projected signal each having an independent transmission path or antenna as taught by Copeland et al in the method of Kelley in view of alternatively Bauer or Gibson because it could be required to keep the individual signals from interfering with each other.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art not relied upon above if cited to further show the state of the art with respect to the transmission of aliased signals generated from digital-to-analog conversion.

U.S. Pat. No. 5047705 to Kasha.

U.S. Pat. No. 6507303 to Alleluias et al.

U.S. Pat. No. 4855894 to Asahi et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M Perilla whose telephone number is (703) 305-0374. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (703) 305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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March 24, 2004

jump

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